Nearshore Marine Biological Survey and Assessment Pinellas County Shore Protection Project Comprehensive Borrow Area Study

December 2002

Prepared for:
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EXECUTIVE SUMMARY

Dial Cordy and Associates Inc. (DC&A) was contracted by the U.S. Army Corps of Engineers, Jacksonville District (Corps) to conduct a nearshore marine environmental baseline survey and report for the Pinellas County Shore Protection Project. This portion of the study focuses on the nearshore pipeline corridors and staging areas leading from potential offshore borrow areas. This work was done under contract GS-10F-0124L. Marine resources were mapped and documented with underwater still and video photography during July and August 2002.

Resources maps and summaries of habitat types delineated during the survey are reviewed in this report. Since the methods to be employed by the dredging contractors are not known, a complete impact assessment cannot be fully reviewed at this time. The information contained in this report should be used for planning of future beach nourishments and renourishments utilizing these offshore borrow areas and corridors. However, further surveying of the pipeline placement during construction, as well as equipment placement may need to be conducted before, during, and after construction to judge actual impacts to the marine resources present in each area.

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1.0 INTRODUCTION

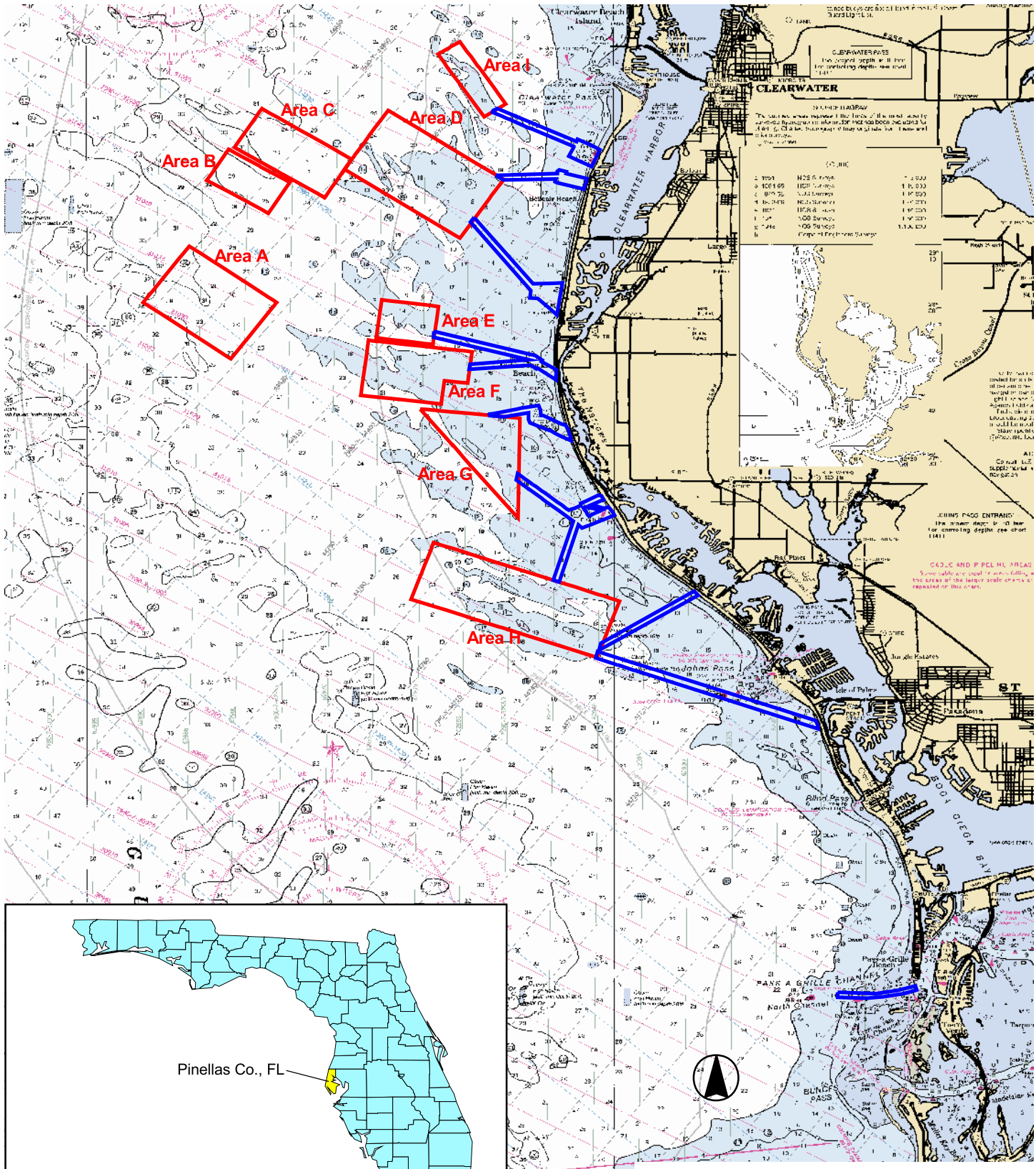
Dial Cordy and Associates Inc. (DC&A) was contracted by the U.S. Army Corps of Engineers, Jacksonville District (Corps) to conduct a nearshore marine environmental baseline survey and report for the Pinellas County Shore Protection Project. This portion of the study focuses on the nearshore pipeline corridors and staging areas leading from potential offshore borrow areas. This work was done under contract GS-10F-0124L.

1.1 Purpose and Need

Shoreline erosion and a lowered beach profile caused by storms, wave action, and currents have become a serious concern along Pinellas County barrier island beaches. As a means of controlling shoreline erosion and providing storm protection to these barrier islands fill material has been placed along the shorelines. The Pinellas County Shore Protection Project has historically obtained beach quality fill from inlet borrow areas and the Egmont Channel Shoal for nourishment of Pinellas County beaches. The use of the Egmont Channel Shoal is not always a cost effective option for nourishment of Pinellas County's beaches due to the logistical and cost constraints associated with moving material such a large distance (22 miles). To help offset some of the costs associated within renourishment activity nine offshore borrow areas have been identified for future use (Dial Cordy 2001). Bathymetry and side-scan sonar of nearshore marine habitats has also been performed (SeaSystems 2001). Identification of nearshore pipeline corridors and staging areas for construction equipment for these offshore areas is evaluated in this report. These nearshore areas required evaluation to document occurrence and quality of marine habitats to facilitate minimization of impacts.

1.2 Location

The project area is located in Pinellas County on the West coast of Florida, near the central portion of the Florida peninsula, approximately 25 miles west of Tampa. The sites investigated include the nearshore areas of Sand Key, Long Key, Treasure Island, and the Pass-a -Grille Channel (Figure 1).



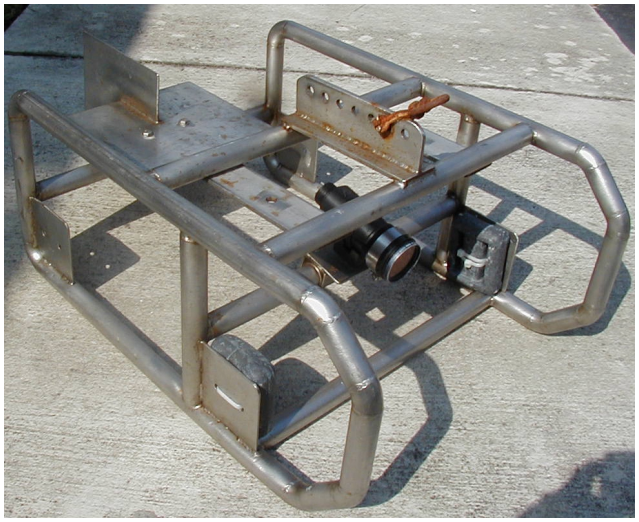
Location Map	
Nearshore Marine Biological Survey and Assessment Pinellas County Shore Protection Project Comprehensive Borrow Area Study	
Scale: 1 inch = 3 miles	Drawn By: MR
Date: October, 2002	
DIAL CORDY AND ASSOCIATES INC	J02-582
	Figure 1

2.0 TECHNICAL APPROACH

DC&A conducted field investigations to locate, delineate, and characterize existing hardground and/or other benthic community resources within the proposed pipeline corridors and staging areas. Marine resources were mapped and documented with underwater still and video photography. The field survey was conducted during July and August 2002.

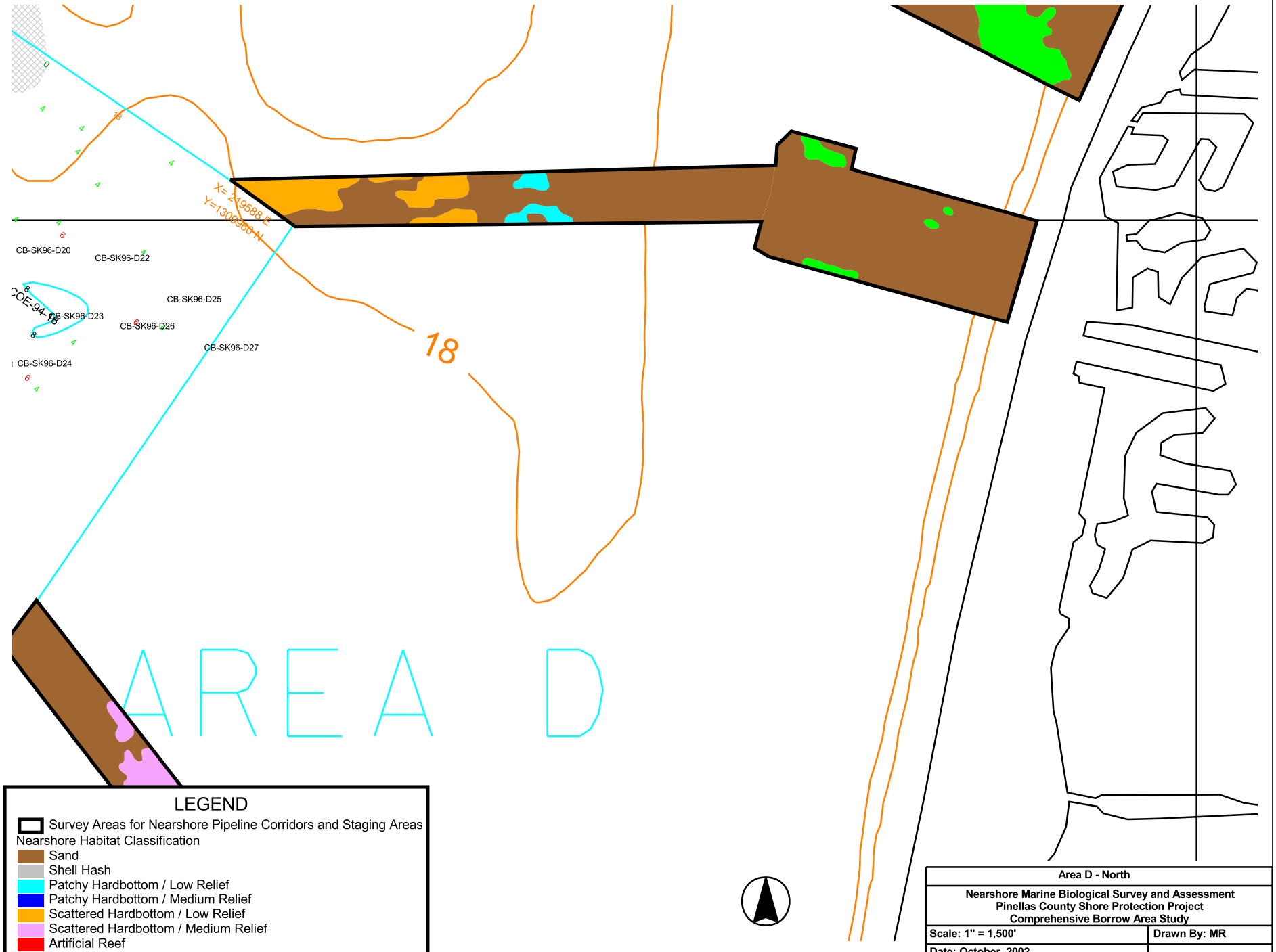
2.1 Towed Video Survey and Mapping

To identify and delineate any marine resources present within the proposed pipeline corridors and staging areas, a towed video survey was conducted. A towed video camera, in conjunction with Differential Global Positioning System (DGPS) and HYPACKMAX™ navigation software, was utilized (Photograph 1). Real time position of the camera was overlaid on the digitally recorded survey record. Transects were established within each area at 100-foot intervals. In total, over 160 nautical miles of transect lines encompassing over 2000 acres were surveyed (Figures 2-9).



Photograph 1 Towed video camera and sled used for mapping and assessment of marine resources offshore Pinellas County

The point at which each transect crossed a change in marine habitat (i.e. hardbottom, sand, etc.) was determined from video analysis. The points were then incorporated into a database and ArcView GIS™ was used to generate resource maps. Hardbottom was classified by percent of coverage and also vertical relief. Hardbottom classifications are shown in Tables 1 and 2.



Area D - North	
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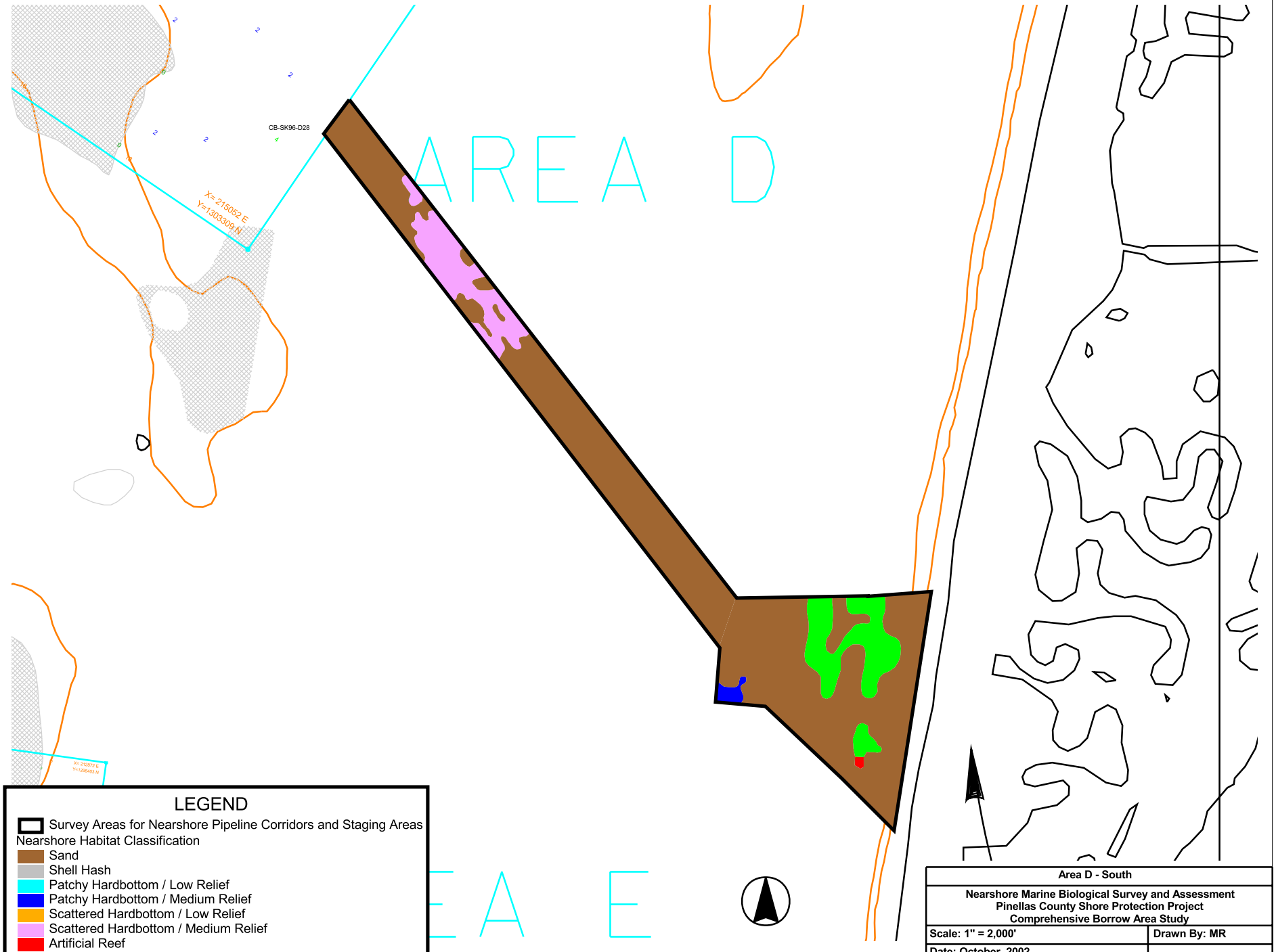
	Figure 2



Area D - South	
Nearshore Marine Biological Survey and Assessment Pinellas County Shore Protection Project Comprehensive Borrow Area Study	
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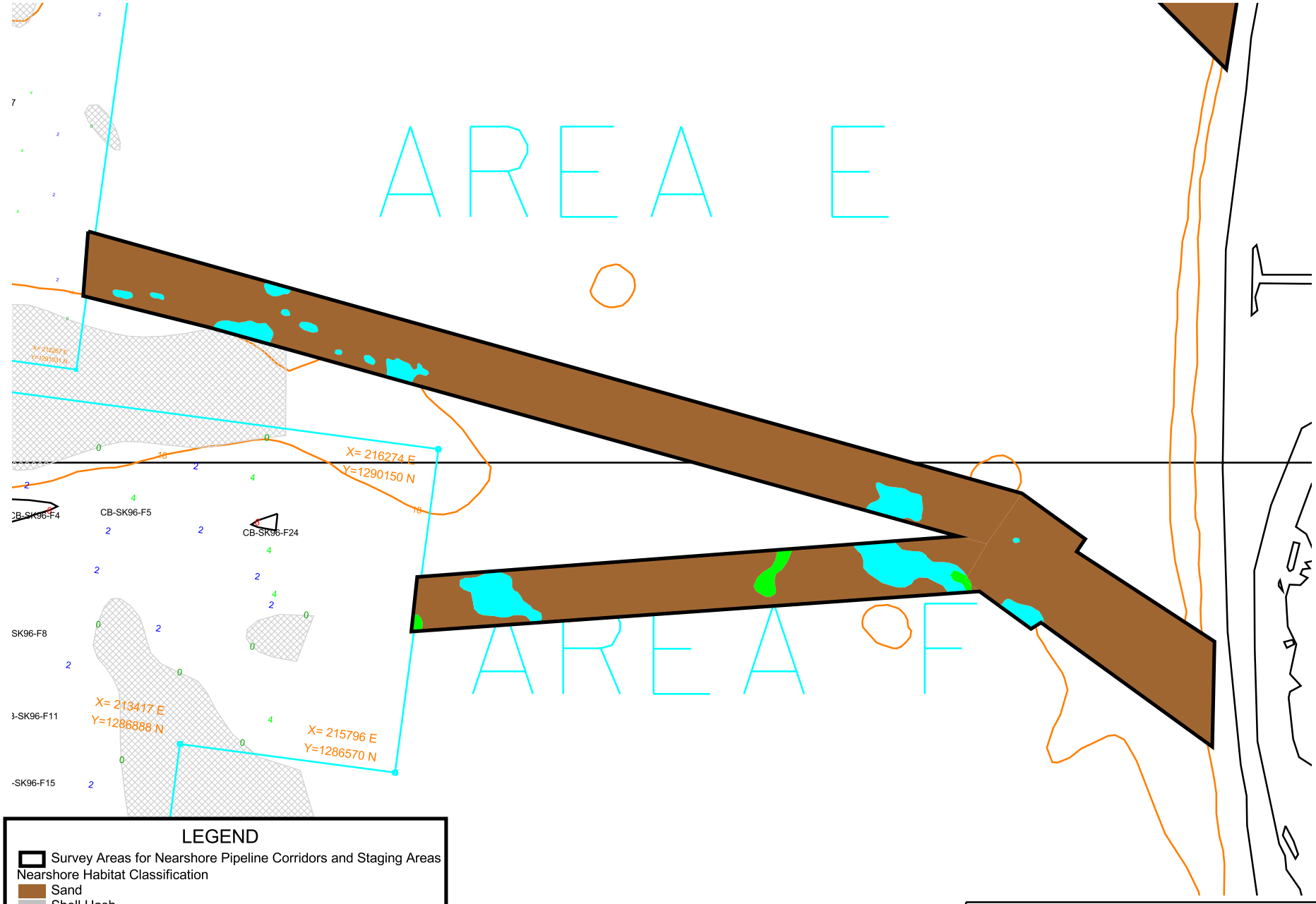

LEGEND

- Survey Areas for Nearshore Pipeline Corridors and Staging Areas

Nearshore Habitat Classification

- Sand
- Shell Hash
- Patchy Hardbottom / Low Relief
- Patchy Hardbottom / Medium Relief
- Scattered Hardbottom / Low Relief
- Scattered Hardbottom / Medium Relief
- Artificial Reef
- Penshell / Shell Hash Community

1500 0 1500 3000 Feet

Area E and F	
Nearshore Marine Biological Survey and Assessment Pinellas County Shore Protection Project Comprehensive Borrow Area Study	
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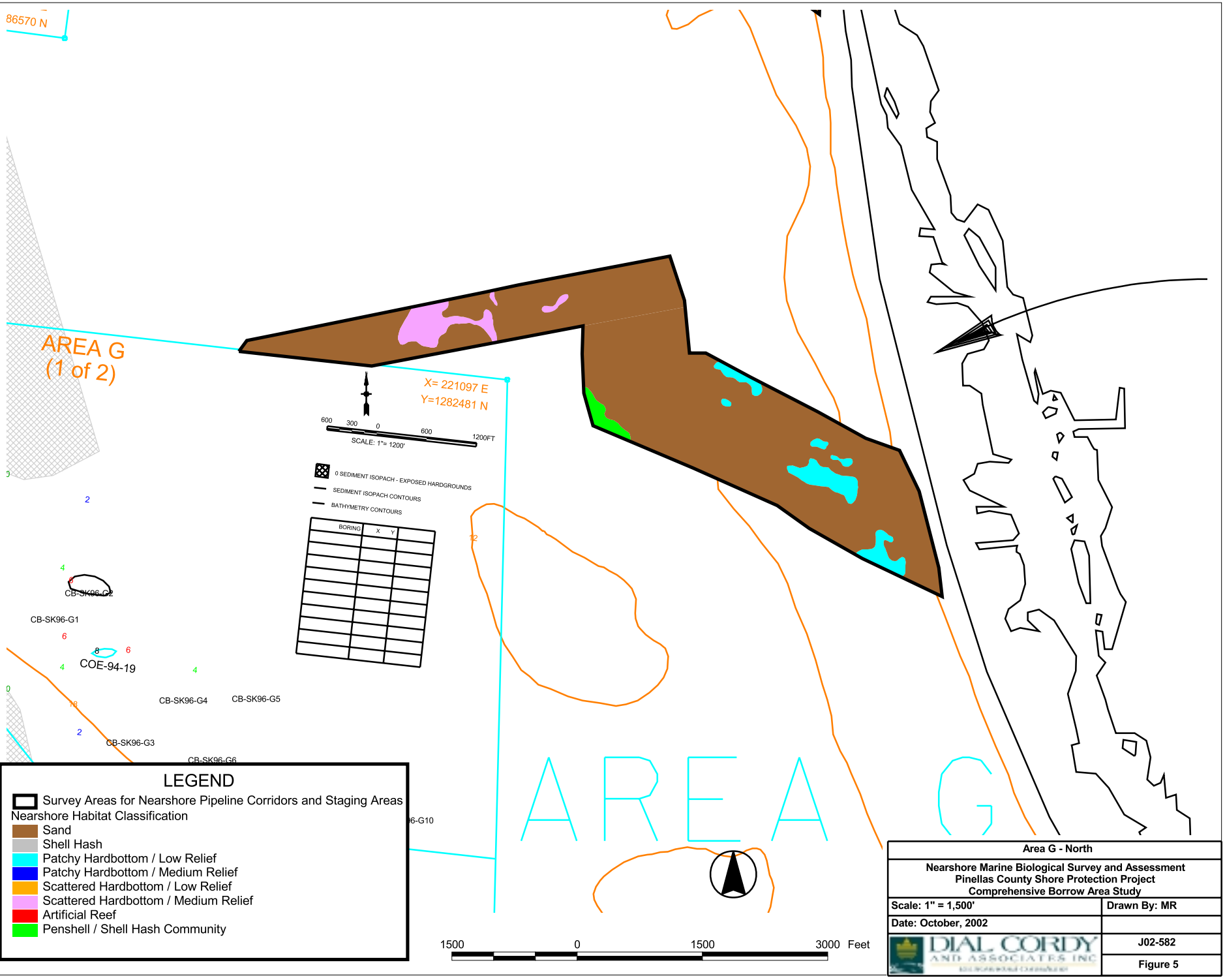
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SEDIMENT ISOPACH CONTOURS
BATHYMETRY CONTOURS
BORING X Y
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CB-SK96-G1
COE-94-19
CB-SK96-G4
CB-SK96-G5
CB-SK96-G3
CB-SK96-G6
CB-SK96-G10
AREA G
LEGEND
Survey Areas for Nearshore Pipeline Corridors and Staging Areas
Nearshore Habitat Classification
Sand
Shell Hash
Patchy Hardbottom / Low Relief
Patchy Hardbottom / Medium Relief
Scattered Hardbottom / Low Relief
Scattered Hardbottom / Medium Relief
Artificial Reef
Penshell / Shell Hash Community
1500 0 1500 3000 Feet
Area G - North
Nearshore Marine Biological Survey and Assessment
Pinellas County Shore Protection Project
Comprehensive Borrow Area Study
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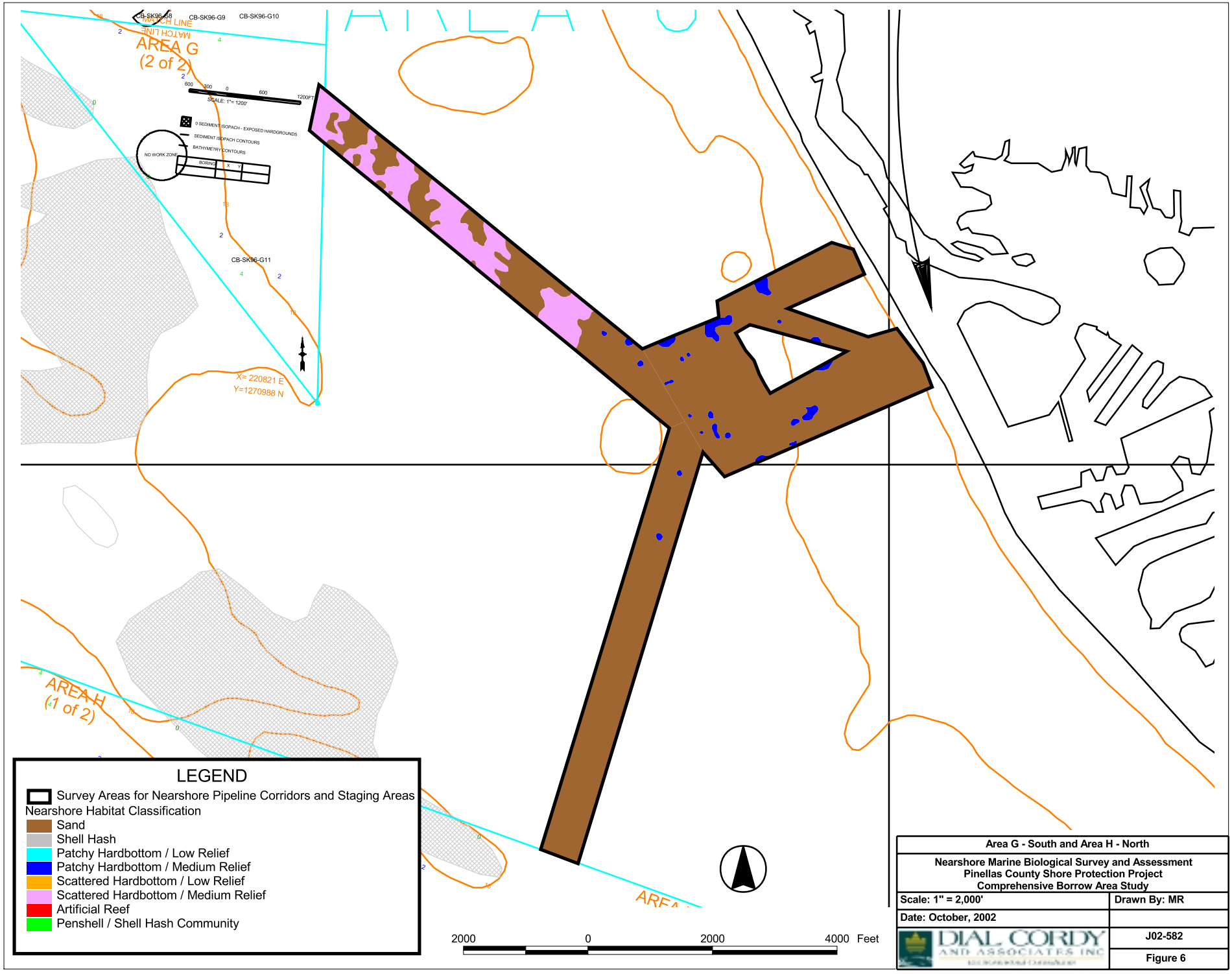
Figure 5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SEDIMENT ISOPACH CONTOURS
BATHYMETRY CONTOURS
NO WORK ZONE
BORING X Y
CB-SK96-G11
X= 220821 E
Y=1270988 N
AREA H
(1 of 2)
LEGEND
Survey Areas for Nearshore Pipeline Corridors and Staging Areas
Nearshore Habitat Classification
Sand
Shell Hash
Patchy Hardbottom / Low Relief
Patchy Hardbottom / Medium Relief
Scattered Hardbottom / Low Relief
Scattered Hardbottom / Medium Relief
Artificial Reef
Penshell / Shell Hash Community
2000 0 2000 4000 Feet
Area G - South and Area H - North
Nearshore Marine Biological Survey and Assessment
Pinellas County Shore Protection Project
Comprehensive Borrow Area Study
Scale: 1" = 2,000'
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Date: October, 2002
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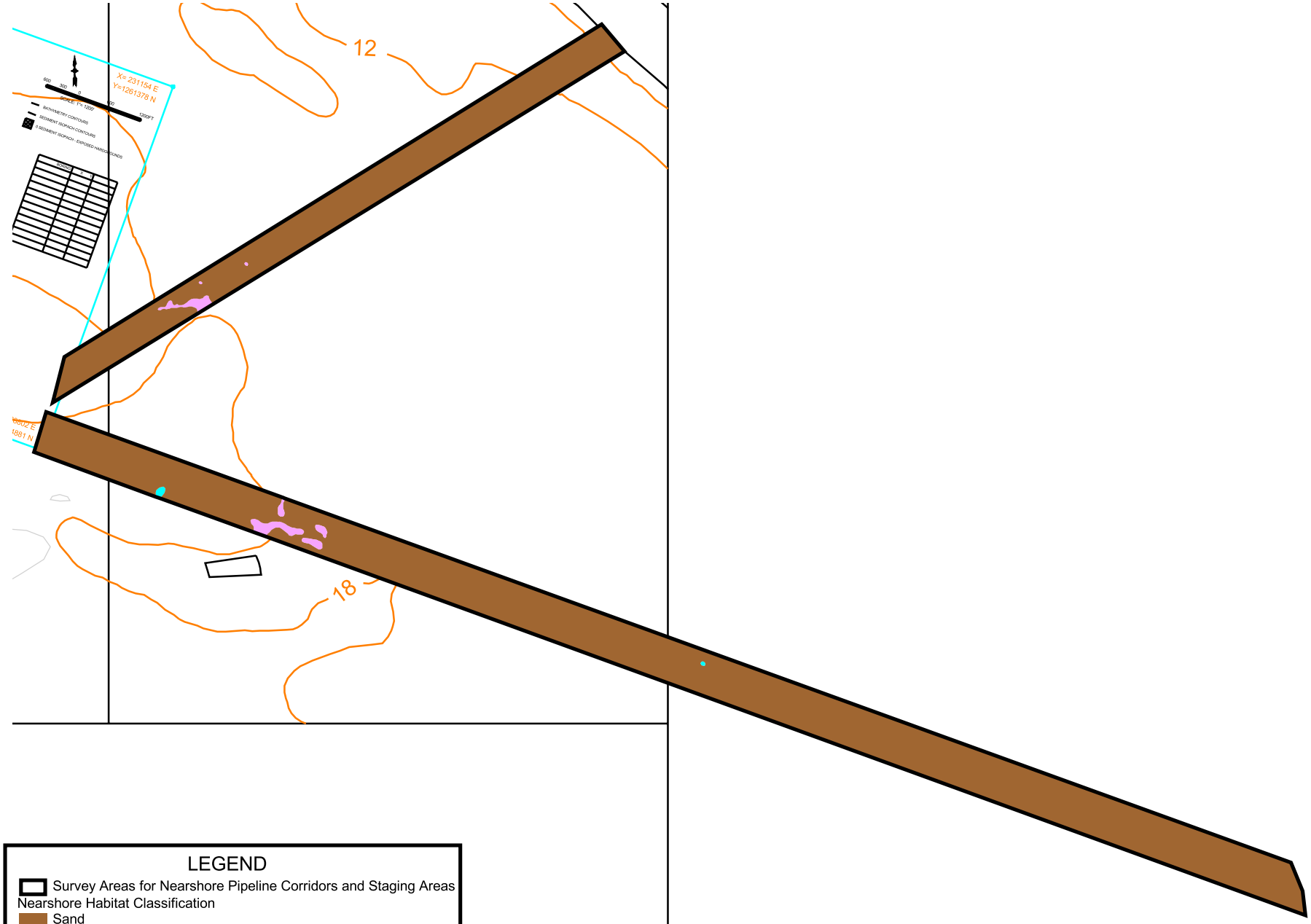
Figure 6



Area H - Central and South	
Nearshore Marine Biological Survey and Assessment Pinellas County Shore Protection Project Comprehensive Borrow Area Study	
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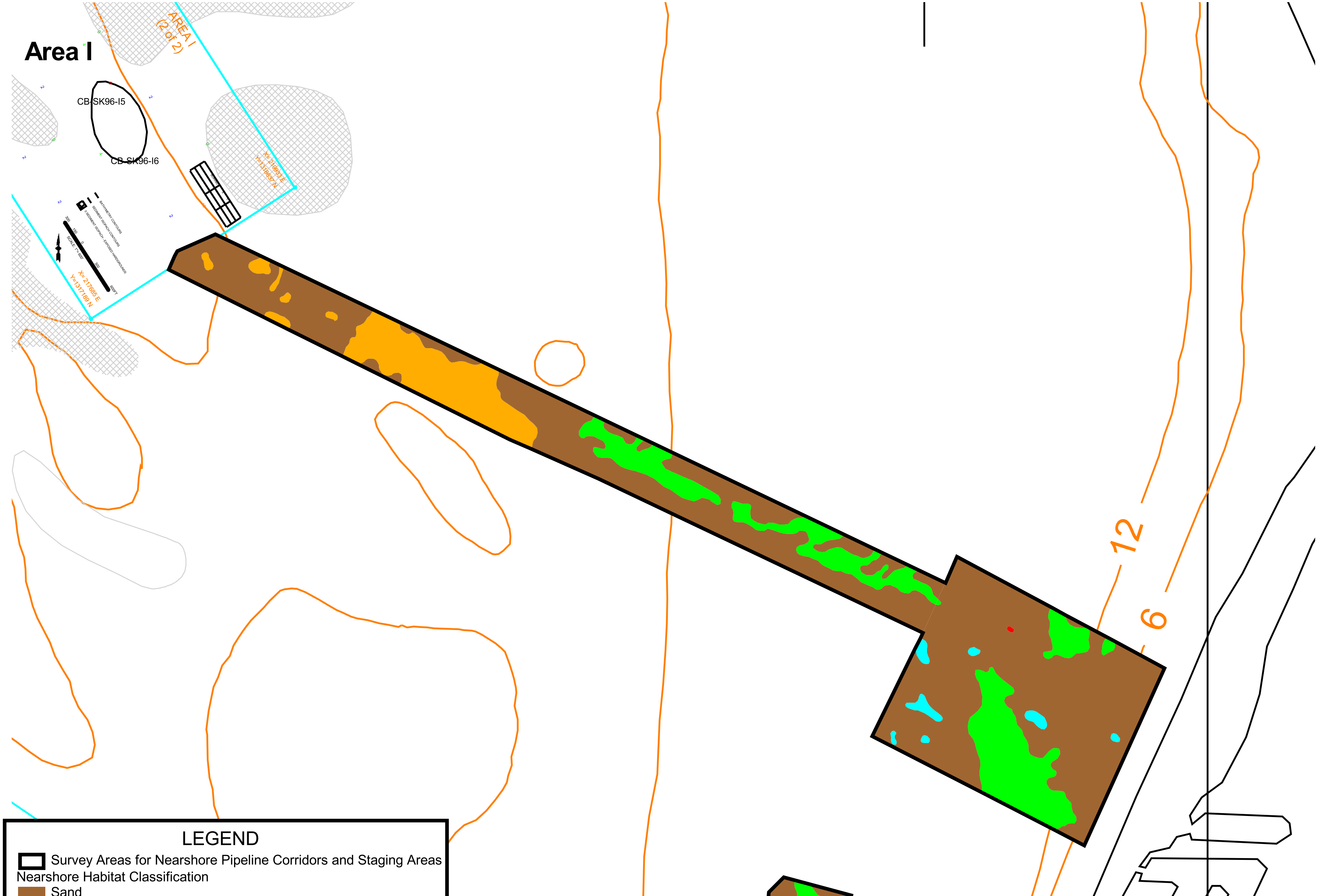
	Figure 7



LEGEND

- Survey Areas for Nearshore Pipeline Corridors and Staging Areas

Nearshore Habitat Classification

- Sand
- Shell Hash
- Patchy Hardbottom / Low Relief
- Patchy Hardbottom / Medium Relief
- Scattered Hardbottom / Low Relief
- Scattered Hardbottom / Medium Relief
- Artificial Reef
- Penshell / Shell Hash Community

Area I	
Nearshore Marine Biological Survey and Assessment Pinellas County Shore Protection Project Comprehensive Borrow Area Study	
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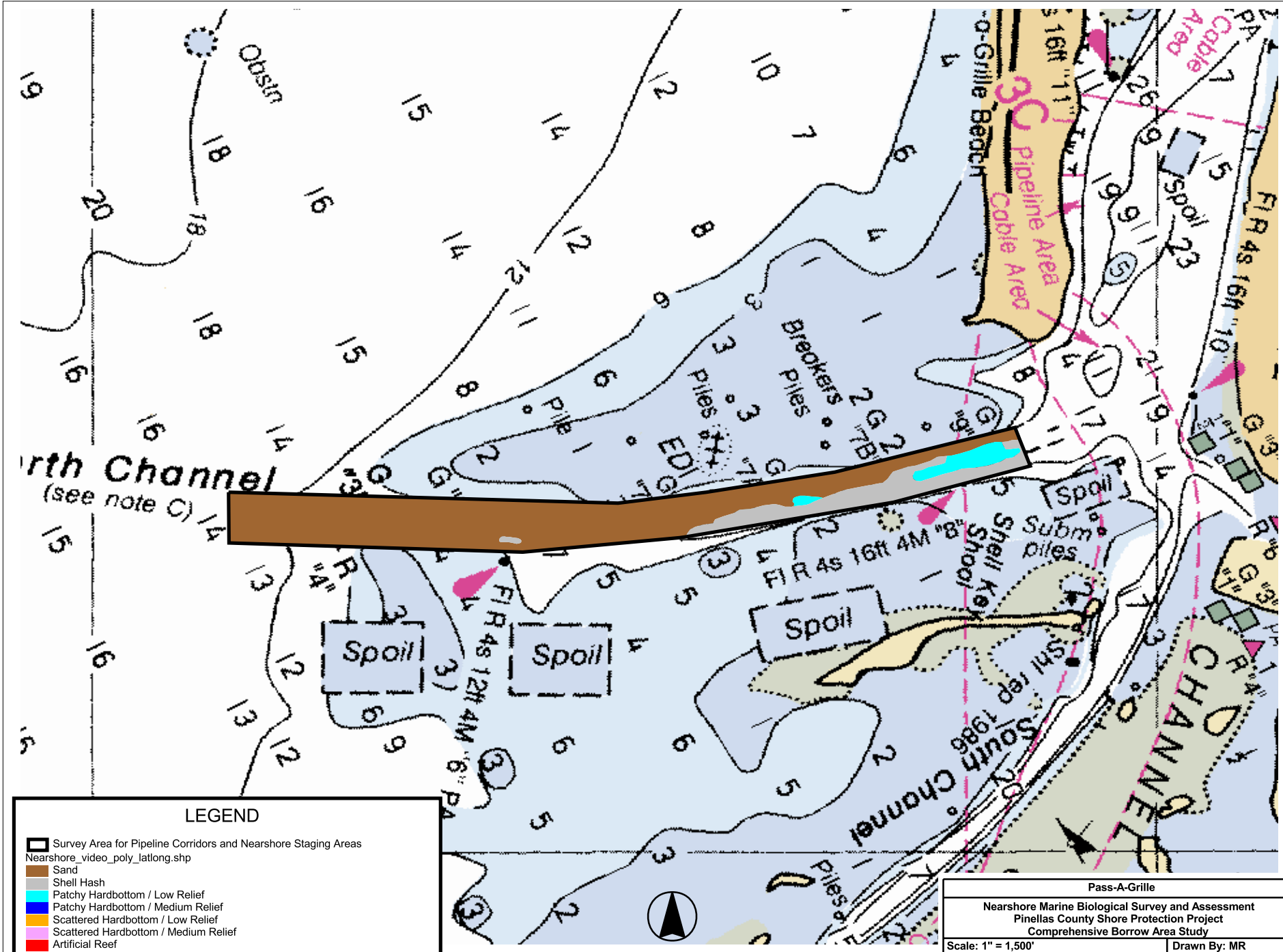

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- Survey Area for Pipeline Corridors and Nearshore Staging Areas
  Nearshore_video_poly_latlong.shp
- Sand
- Shell Hash
- Patchy Hardbottom / Low Relief
- Patchy Hardbottom / Medium Relief
- Scattered Hardbottom / Low Relief
- Scattered Hardbottom / Medium Relief
- Artificial Reef
- Penshell / Shell Hash Community
- Offshore Borrow Areas (Dial Cordy, 2001)

1500 0 1500 3000 Feet

Pass-A-Grille	
Nearshore Marine Biological Survey and Assessment Pinellas County Shore Protection Project Comprehensive Borrow Area Study	
Scale: 1" = 1,500'	Drawn By: MR
Date: October, 2002	
DIAL CORDY AND ASSOCIATES INC	J02-582
	Figure 9

Table 1 Hardbottom Coverage Classification Used to Map Marine Resources

Classification	Percent Coverage
Penshell/Shellhash	Variable coverage in nearshore areas
Patchy	< 20% coverage
Scattered	20-75% coverage
Dense	>75% coverage

Table 2 Hardbottom Relief Classification Used to Map Marine Resources

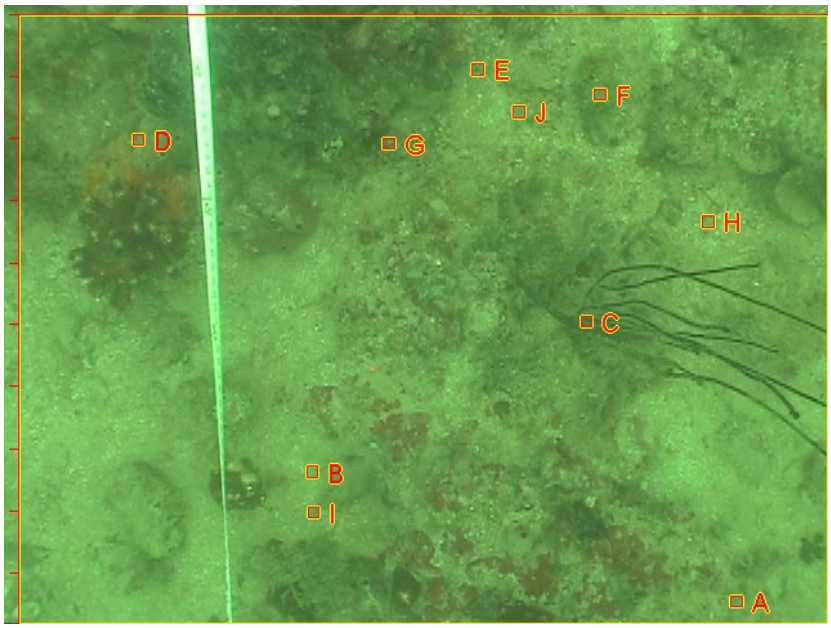
Classification	Relief (cm)
Low Relief	<30 cm
Medium Relief	30-100 cm
High Relief	>100 cm

2.2 Diver Survey and Characterization

In addition to the towed video survey, diver characterizations of existing habitats were also conducted. Representative habitat types, as determined from video analysis, were located and divers deployed to document the dominant invertebrate, fish, marine algae, and coral communities present within each of the survey areas.

2.2.1 Digital Image Analysis

The aim of the image analysis portion of the survey was to characterize the sessile biota (hard corals, soft corals, sponges and algae) located within each survey area. Within each survey area a 50 m transect was randomly laid to assess coverage of livebottom resources in the area. A diver with a digital video camera would then swim along the transect and collect a still image of the bottom type at every 5 m. Distance from the transect line was kept constant using a positioning device attached to the camera to allow for comparison between images. Images were then post processed and a random point analysis done on the images to assess percent coverage of habitat types (USGS BRD 2000). These images were viewed in Adobe Photoshop ® 5.0.2 and overlaid with 10 random dots on each photograph (Microsoft Excel® 2000) (Photograph 2). Percent coverage was estimated by counting the total number of dots covering each habitat type and data collected in a spreadsheet. The percent cover of each habitat type was then determined for each area and this summary percent cover used to map the respective habitats in each area.



Photograph 2 Sample grabbed digital image with point count dot overlay used in percent cover analysis.

Vertical relief and overall quality were also recorded. Still photographs and hand held video were also used to document the type and extent of living cover located within these areas.

2.2.2 Hardbottom Relief Assessment

Along each 50 m transect, relief measurements of hardbottom resources were also taken. At each 5 m sampling location, a graduated measuring rod was used to estimate the relief from the seafloor of significant marine resources. These measurements were averaged over each transect and the average relief of the survey area utilized for characterization and mapping.

3.0 MARINE RESOURCE CHARACTERIZATION

This section summarizes the results of the two-year comprehensive survey of offshore borrow areas, pipeline corridors and staging areas, as well as a review of pertinent literature.

3.1 Overview of Marine Resources

The area surveyed included areas offshore of Pinellas County, FL. These potential borrow areas, pipeline corridors and staging areas exist in water depths up to ten meters. Lyons and Collard (1974) describe these communities as areas of moderate wave energy with quartz sand and shell fragments extending offshore. Large temperate mollusks and echinoderms tend be the dominant faunal elements. In areas over 10 meters in depth, exposed rock substrate allows for the establishment of scleractinian, molluscan, crustacean, tunicates, and other species more common to shallower waters of south Florida (Smith 1974, Lyons and Collard 1974). Quartz sands, with biologically influenced carbonates present, also dominate the sediments within this area.

3.1.1 Fishes

Fishes off of the Gulf coast of western Florida are comprised of both reef and pelagic species. Many of the species present within this area are of commercial importance and addressed under the National Marine Fisheries Service (NMFS) Gulf of Mexico Fishery Management Council (GMFMC) Management Plan (GMFMC 1998). The fish assemblages in the area offshore of Pinellas County Florida and the Gulf of Mexico have been studied many times in the past. These studies have included reports which characterize the offshore and nearshore assemblages of fishes (Moe and Martin 1965; Saloman and Naughton 1979), cold stress of fishes on reef areas (Gilmore, et. al 1978; Bullock, et. al 1979), growth and reproduction (Shirripa and Burns 1997; Bullock, et. al 1996), and the impacts of fishing activities and predation (Pierce, et. al 1998; Nelson and Bortone 1996), as well as many others.

Moe and Martin (1965) collected over 2300 individual fishes from 41 species during sampling conducted nine separate locations offshore of Pinellas County. The most common fishes collected during this survey included sand perch (*Diplectrum fromosum*), pigfish (*Orthopristus chrysopterus*), silver perch (*Bairdiella chrysura*), spot (*Leiostomus xanthurus*), and pinfish (*Lagodon rhomboides*). Other species collected in this study included searobins (*Prionotus tribulus crassiceps* and *Prionotus scitulus latfirons*) and three species of flounder (*Etropus rimosus*, *E. crossotus atlanticus*, and *Syacium papillosum*).

Fishes of commercial and recreational importance within the eastern Gulf of Mexico include groupers and snappers. These species are included in the GMFMC snapper-grouper complex

fisheries management plan (1998). Species common to the area include yellowedge grouper (*Epinephelus flavolimbatus*) (Bullock, et. al 1996), gag (*Mycteroperca microlepis*) and red grouper (*Epinephelus morio*) (Schirripa and Burns 1997). Many of these species have been subjected to overfishing and stocks within the area have declined. This include red porgy (*Pargus pargus*), vermilion snapper (*Rhomboplites aurobens*), and other grouper species (*Epinephelus* sp.) (Roberts, et al. 1995).

Pelagic species also occur throughout the Gulf of Mexico in the nearshore and offshore waters. Major coastal pelagic families include Rachycentridae (cobia), Mugilidae (mullets), Pomatomidae (bluefish), Caranagidae (jacks), Scombridae (tunas and mackerels), Engraulidae (anchovies), and Carahahinidae (requieum sharks). Many of these pelagic species form large schools (e.g. jacks, mullet, mackerel, etc.), while others travel singly or in small groups (e.g. cobia). Distribution of these species can vary seasonally and usually depends on water column attributes that vary seasonally.

Fishes observed during diver and video surveys in this study are shown in Table 3. In total 22 species from 16 families were observed. Most species observed included small demersal species common to hardbottom areas. The most common species observed were sand perch (*Diplectrum fromosum*) and belted sandfish (*Serranus subligarius*); wrasses, in particular the slippery dick (*Halichoeres bivittatus*), were also very common in the study area. Other common fishes included searobins (*Prionotus* sp.) and menhaden (*Brevoortia sp.)*. Anecdotal observations of fishes during the survey included large schools of baitfish (Engraulidae and Clupeidae), sharks (Carahahinidae), seahorse (Sygnathidae), batfish (Ogcocephalidae) and mackerel (Scombridae).

Table 3 Fishes Observed Within Borrow Area During Diving Surveys

Scientific Name	Common Name
Haemulon sp.	Juv. Grunt
Equetus umbrosus	Juv. Highhat
Haemulon sciurus	Bluestriped Grunt
Haemulon chrysargyreum	Smallmouth Grunt
Haemulon melanurum	Cottonwick
Lutjanus griseus	Gray Snapper
Lachnolaimus maximus	Hogfish
Synodus intermedius	Sand Diver
Opsanus beta	Toadfish
Monocanthus sp.	Filefish
Halichoeres bivittatus	Slippery Dick
Diplectrum fromosum	Sand Perch
Archosargus probatocephalus	Sheepshead
Chaetodipterus faber	Spadefish
Calamus sp.	Porgy
Parablennius marmoreus	Seaweed Blenny

Scientific Name	Common Name
Diplodus holbrooki	Spottail Pinfish
Brevoortia sp.	Menhaden
Prionous sp.	Searobin
Echeneis naucrates	Sharksucker
Centropristis striata	Black Sea Bass
Epinephelus morio	Red Grouper
Sphoeroides testudineus	Checkered Puffer
Serranus subligarius	Belted Sandfish

3.1.2 Invertebrates

Benthic invertebrates associated with livebottom habitats along the eastern Gulf of Mexico include scleractinian, molluscan, crustacean, tunicates, octocoral, echinoderm, and porifera species. Many of these species are similar to species found in the more tropical waters of the Caribbean and south Florida reef tract. Lyons and Collard (1974) characterize the shallow shelf habitat offshore of Pinellas County as an area with sediments dominated by quartz sand and biogenically derived carbonates with exposed rock substrate. This substrate provides habitat for scleractinian, molluscan, crustacean and other invertebrate species.

Previous studies have identified species common to habitats offshore of Pinellas County (EPA 1981; CZR 1991; Child 1992; Posey et. al 1996). The species listed in these previous studies compares closely to species observed during this survey (Table 4). In total, over 40 dominant invertebrates species were observed from the diver and video surveys. There are many more cryptic and less obvious species present within these complex habitats.

Table 4 Dominant Invertebrate Species Observed During Borrow Area Surveys

Scientific Name	Common Name
Echinoderms	
Linckia guildingii	Common Comet Star
Astropecten articulatus	Beaded Sea Star
Echinaster spinulosus	Orange-Ridged Sea Star
Luidia clathara	Striped Sea Star
Luidia sp.	Sea Star
Luidia alternata	Banded Sea Star
Echinometra lucunter	Rock-boring Urchin
Lytechinus variegates	Variegated Urchin
Mollusks	
Pinna carnea	Penshell
Charonia variegata	Tritons Trumpet
Busycon contrarium	Lightning Whelk
Pleuroploca gigantean	Florida Horse Conch

Scientific Name	Common Name
Scleractin Corals	
Cladocora arbuscula	Tube Coral
Stephanocoenia mitchelinii	Blushing Star Coral
Isophyllia sinuosa	Cactus Coral
Siderastrea sp.	Starlet Coral
Solenastrea hyades	Knobby Star Coral
Scolymia lacera	Mushroom Coral
Phyllangia americana	Hidden Cup Coral
Manicina aereolata	Rose Coral
Montastrea annularis	Boulder Star Coral
Oculina robusta	Robust Ivory Tree Coral
Millepora alcicornis	Branching Fire Coral
Octocorals	
Eunicea succinea	Shelf-knob Sea rod
Eunicea calyculata	Warty Sea Rod
Plexaurella nutans	Giant Slit-Pore Sea Rod
Muricea laxa	Delicate Spiny Sea Rod
Muricea elongata	Orange Spiny Sea Rod
Pseudoterogorgia sp.	Sea Plume
Pterogorgia citrina	Yellow Sea Whip
Leptogorgia virgulata	Colorful Sea Whip
Sponges	
Cribrochalina vasculum	Brown Bowl Sponge
Xestospongia muta	Giant Barrel Sponge
Spheciospongia vesparium	Loggerhead Sponge
Ircinia sp.	Ball Sponge
Calyx podatypa	Dark Volcano Sponge
Anthosigmella varians	Brown Variable Sponge
Amphimedon compressa	Erect Rope Sponge
Pseudoceratina crassa	Branching Tube Sponge
Crustaceans	
Menippe mercenaria	Florida Stone Crab
Tunicates	
Clavelina sp.	Colonial tunicates
Family Didemnidae	Overgrowing Tunicates
Eudistoma sp.	Condiminium Tunciate

3.1.3 Marine Algae

The marine algae present within the areas offshore of Pinellas County are extremely diverse. Phillips, et al. (1960) identified 95 taxa of algae within areas of similar depth in this area. Dominant algal species observed during this and other studies includes *Caulerpa* sp., *Halimeda* sp., *Udotea flabellum*, *Sargassum* sp., and *Rhipocephalus phoenix* (Phillips, et al. 1960; EPA 1981; CZR 1991).

3.1.4 Other Vertebrates

Other vertebrate species, which utilize these offshore habitats, include many threatened and endangered species. The Gulf of Mexico is within the range of five species of sea turtle, the West Indian manatee (*Trichechus manatus*), and up to 28 cetacean species. Of these, four species of sea turtle, the manatee, and one cetacean, the bottlenose dolphin (*Tursiops truncatus*), occur within the study area.

3.1.4.1 Sea Turtles

Four species of sea turtle commonly occur within the area around Pinellas County (Meylan, et al. 1999; EPA 1981). These are the loggerhead (*Caretta caretta*), green (*Chelonia mydas*), Kemp's ridley (*Lepidochelys kempii*), and the hawksbill (*Eretmochelys imbricata*). The loggerhead is listed as threatened and the other three species are listed as endangered. Loggerhead turtles represent most of the sea turtles present in the Pinellas County area. Data collected on sea turtle nesting in the area shows that the majority of the nests within this area consist of loggerhead nests (Table 5). Of the 279 nests observed on Pinellas County beaches in 2000, 278 were loggerhead nests and all 195 nests in 2001 were loggerhead. The only other nesting activity reported was one green turtle nest. In 2000, there was one reported green turtle nest and in 2002, two Kemp's Ridley nests were found on Sand Key (FMRI 2002). All turtles observed during this survey were loggerhead turtles; which were seen with regular consistency while conducting the survey. Stranding records within the Pinellas County area also confirmed that loggerhead turtles are the most numerous species.

Table 5 Summary of Loggerhead Sea Turtle Nesting From 1988-2000

Year	Beach Length Surveyed	Number of Nests
1988	69.5	56
1989	63.2	92
1990	62.1	144
1991	67.3	175
1992	63.3	142
1993	42.7	105
1994	52.6	138
1995	58.8	229
1996	49.1	223
1997	58.8	181
1998	52.3	233
1999	62.6	172
2000	62.6	279
2001	62.6	195

Source: Florida Marine Research Institute 2002

3.1.4.2 Marine Mammals

Marine mammals commonly present within the waters nearshore and offshore the study area include manatee and bottlenose dolphin. Bottlenose dolphins were commonly observed while conducting this survey. As many as 15 dolphins were observed at one time in the areas adjacent to the offshore borrow areas. Weigle (1990) documented that at least three distinct herds of dolphin are common within the Lower Tampa Bay area. This includes as many as 246 individual animals. Many of the dolphins observed may have been transient in nature. However, 75 individuals were observed on more than one occasion.

West Indian manatees also utilize habitats within the study area. Manatees inhabit both fresh and saltwater and may be encountered in canals, rivers, estuaries, bays, and on occasion have been observed as far as 6 km off the Florida Gulf coast (USFWS 1996). Aerial surveys indicate that as many as 190 manatees may use Tampa Bay (Ackerman 1995). Surveys show that over 900 manatees inhabit the west coast of Florida. The highest concentrations of manatees along Florida's Gulf coast exists in Citrus, Levy, Lee, and Collier Counties. Data suggest that of the manatees living in the Tampa Bay area, most occur within the bay where water temperatures are more stable year round. During aerial surveys in 1992, only 15 manatees were surveyed in the eastern portion of Tampa Bay (Akcerman 1995). Examination of the manatee mortality data for Pinellas and Hillsborough Counties shows that from January 2000-October 2001 a total of 27 manatee deaths were reported. The majority of these deaths involved perinatal, cold stress, or other natural causes.

3.1.5 Hardbottom and Livebottom Characterization

Hardbottom and livebottom within each of the survey areas was characterized for mapping and impact assessment. A summary of the results for each area is discussed in this section.

3.1.5.1 Digital Image Analysis

The aim of the image analysis portion of the survey was to characterize the sessile biota (hard corals, soft corals, sponges, and algae) located within each survey area. A total of 132 photographic quadrats were collected and analyzed. Overall, the mean coverage of living resources within all areas was 26.7 percent. A summary breakdown of means for each coverage classification is shown in Table 6. The major cover types within each area surveyed were sponges and macroalgae. Hard corals accounted for the lowest percentage living cover types identified with 0.7 percent.

Table 6 Summary of Mean Percent Cover For Each Classification Category From Image Analysis For All Areas Surveyed

Classification	Mean Cover (%)	Standard Deviation (n=132)
Coral	0.7	0.7
Gorgonians	4.2	5.5
Sponges	10.6	10.5
Macroalgae	9.8	6.2
Other, Live	1.4	3.4
Sand, Rubble	72.6	17.4
Unknown	0.7	0.7

3.1.5.2 Relief

Relief measurements within each survey area were averaged to obtain the mean relief within each area. These mean relief numbers were then used during the mapping of each area to develop a characterization of each area. A summary of mean relief within each area is shown in Table 7.

Table 7 Summary of Mean Relief From Diver Characterization

Survey Area	Mean Relief (cm)	Standard Deviation (n=11)
Area D South Site 1	39	6.1
Area D South Site 2	20.9	15.6
Area D	9.5	7.2
Area D Staging Area	3.9	3.6
Area E	1.4	3.2
Area F	12.2	13.1
Area F Staging Area	7.7	17.7
Area G North	20	22.5
Area G South	23.6	22.6
Area H	32.2	28.4
Area I	23.2	11.7

The extremely variable hardbottom distribution within each area accounts for the deviations in relief within each area. Outcroppings of limestone covered in living bottom interspersed with patches of open substrate are common in these areas. This mosaic of habitats creates communities of hardbottom/livebottom within these areas. Penshell/shellhash communities in these nearshore locations characterized survey areas with particularly low relief.

3.2 Pipeline Corridors

This section contains a description of marine resources located within each potential pipeline corridor surveyed. A summary of hardbottom resources within each pipeline corridor is shown in Table 8.

Table 8 Summary of Marine Resource Cover Types Within Each Area Surveyed

	Acres						
Corridor Survey Areas	**Sand**	**Penshell /Shellhash**	**Patchy Low Relief**	**Patchy Medium Relief**	**Scattered Low Relief**	**Scattered Medium Relief**	**Shellhash**
Area D north	58.9	------	4.0	------	17.4	------	------
Area D south	117.6	------		------	------	29.9	------
Area E	149.1	------	10.2	------	------	------	------
Area F	69.6	3.1	15.2	------	------	------	------
Area G north	58.1	------	------	------	------	7.9	------
Area G south	65.2	------	------	0.6	------	50.1	------
Area H north	159.3	------	------		------	2.7	------
Area H center	103.1	------	------	0.4	------	------	------
Area H south	418.4	------	0.7	------	------	5.5	------
Area I	80.7	20		------	27.8		------
Pass-a-grille	75.8	------	4.6	------			16.2
Staging Area Survey Areas							
Area D north (R62-R-63)	86.2	4.3	------	------	------	------	------
Area D south (R-74-R-78)	132.7	32.9	------	2.7	------	------	------
Area EF (R-84-R-86)	66.4	0.1	1.9	------	------	------	------
Area G north (R-91-R-93)	125.3	2.6	9.9	------	------	------	------
Area G south (R-99-R-103)	172.4	------	------	8.2	------	------	------
Area I (R-58-R-61)	99.4	27.0	3.2	------	------	------	------

3.2.1 Borrow Area D

Borrow Area D is located in the northern extent of the survey area offshore Pinellas County (Figure 1) (Dial Cordy 2001). Two potential pipeline corridors were identified from prior investigations and surveyed for marine resources.

3.2.1.1 North Corridor

Marine resources in the north corridor of Area D are shown in Figure 2. Marine resources located in this potential pipeline corridor include 17.4 acres of scattered/low relief hardbottom. These resources are located along the western extents of the corridor near the borrow area. An additional 4.0 acres of patchy/low relief hardbottom is also located in this corridor. Overall the hardbottom within this corridor is variable in its distribution and very low relief.

3.2.1.2 South Corridor

The south corridor for Area D contains a total of 29.9 acres of hardbottom habitat. These marine resources are located primarily in one extensive area of scattered/medium relief hardbottom (Figure 3). This hardbottom habitat has an average relief of over 30 cm. Percent coverage of hardbottom features in this area was over 20 percent living resources.

3.2.2 Borrow Area E

Area E could provide over 1MCY of material for potential placement along Indian Rocks Beach (Figure 4) (Dial Cordy 2001). Hardbottom resources within the pipeline corridor for Area E are limited to 10.2 acres of patchy/low relief hardbottom. Diver characterization of these resources revealed an average relief of less than 10 cm and an average coverage by living resources of less than 10 percent.

3.2.3 Borrow Area F

The pipeline corridor leading from Borrow Area F contains 18.2 acres of marine livebottom resources. These resources consist of 15.2 acres of patchy low relief hardbottom and an additional 3.1 acres of penshell/shellhash community. These hardbottom resources had an average of 33 percent cover and a relief of 27 cm with a mean relief over the entire area of 12.2 cm.

3.2.4 Borrow Area G

Borrow Area G has over 1.5 MCY of material available for placement along Pinellas County's beaches (Dial Cordy 2001). This material is situated over 1,100 acres of seafloor approximately 1.8 nm offshore of the area just south of Indian Rocks Beach, FL (Figure 1).

3.2.4.1 North Corridor

The northern corridor leading from Borrow Area G contains areas of scattered/medium relief hardbottom (Figure 5). These areas of scattered hardbottom total 7.9 acres and occur in the center of the pipeline corridor. This medium relief (μ=20 cm) hardbottom has an average percent cover of 33.3 percent. The most dominant living resource features covering the limestone in these areas were macroalgae and sponges (19.2 percent and 0.1 percent, respectively). Four percent of the living bottom surveyed along the transects surveyed were covered in gorgonian species.

3.2.4.2 South Corridor

The southern pipeline corridor leading from Borrow Area G has extensive hardbottom features (Figure 6). In total there are 50.1 acres of scattered/medium relief hardbottom and 0.6 acres of patchy/medium relief hardbottom within the survey limits of this pipeline corridor. The average percent cover of these hardbottom features was 35.5 percent with an average relief of 23.6 cm. Hardbottom features in this area consisted of medium relief limestone ledges and outcrops. Gorgonian species were one of the dominant features covering these rock features and accounted for 16.4 percent of the living cover.

3.2.5 Borrow Area H

Borrow Area H is the southernmost offshore borrow area surveyed and contains approximately 2.7 MCY material that could be placed on Pinellas County's beaches. Borrow Area H is 2.8 nautical miles offshore of the Treasure Island area (Dial Cordy 2001). Three pipeline corridors were surveyed, a northern corridor that terminates in the staging area located offshore of Florida Department of Environmental Protection (FDEP) Monuments R-99 to R-103, a central corridor that terminates on the beach just north of Johns Pass, and a southern corridor that would allow sand to be placed south of the Johns Pass area (Figures 1, 6, and 7).

3.2.5.1 North Corridor

The northern pipeline corridor leading from Borrow Area H has very little hardbottom resources located within the extents of the survey area. Only 2.7 acres of hardbottom resources were located during this survey. These are two small areas of patchy/medium relief hardbottom located near the nearshore end of the corridor (Figure 6).

3.2.5.2 Center Corridor

The central pipeline corridor for Borrow Area H contains one small area of hardbottom. This area of patchy/medium relief hardbottom covers 0.4 acres of seafloor. No other hardbottom resources exist in this pipeline corridor (Figure 7).

3.2.5.3 South Corridor

The longest pipeline corridor surveyed was the southern corridor leading from Borrow Area H. This corridor was just over 4 nautical miles in length. Located within this survey area was 5.5 acres of scattered/medium relief hardbottom. This area has a 41 percent living resource cover and a relief of approximately 50 cm. Sponges were the most dominant resource cover type in these hardbottom areas and results of the image analysis reveal that 16.4 percent was covered with sponge growth, while in this same area, macroalgae accounted for 12.7 percent and gorgonians 1.8 percent of the coverage.

3.2.6 Borrow Area I

Borrow Area I is the northern most and smallest of the offshore borrow areas. One pipeline corridor was investigated for Borrow Area I and would allow material to come ashore in the area south of Clearwater Pass (Figures 1 and 8).

Located within the pipeline corridor for Area I is an extensive area of scattered/low relief hardbottom. This area of hardbottom covers over 27.8 acres and extends the entire width of the surveyed corridor. Additionally, there are 20 acres of penshell/shellhash community along the eastern portion of this pipeline corridor. Point count analysis and diver characterizations show that this area of low relief hardbottom covers approximately 50 percent of the bottom where it occurs and has a relief of 23 cm. Sponges (32.1 percent), macroalgae (10.4 percent), gorgonians (3.8 percent, and corals (2.8 percent) are the cover types that typify these hardbottom areas.

3.3 Nearshore Staging Areas

Since the methods that dredging contractors will use to move the sand from the offshore borrow areas to the beach to be nourished is not known (i.e. hopper dredge, cutterhead dredge etc.) nearshore staging areas for dredge equipment were also surveyed for potential use. In total, six nearshore staging areas were surveyed and a summary of marine resources located in each area is discussed in this section.

3.3.1 Borrow Area D North (R-62 to R-63)

The staging area for the pipeline corridor Borrow Area D north is located offshore of FDEP Monuments R-62 to R-63. This staging area and nearshore corridor is predominately sand bottom with a few areas of penshell/shellhash communities. In total, 4.3 acres of penshell/shellhash community exists within this area (Figure 2). These communities, while not true hardbottom, do support a variety of marine life. In particular, it is an important community for the stone crab, which was documented extensively in these areas during the diver characterization.

3.3.2 Borrow Area D South (R-74 to R-78)

Located offshore between monuments R-74 to R-78 is the staging area surveyed for the pipeline corridor leading from the southern end of Borrow Area D (Figure 3). This staging area and nearshore corridor contains a permitted Pinellas County artificial reef site. The location of this artificial reef is shown on Figure 3. During the survey, debris from this artificial reef site was located north of the buoys marking the limits of the artificial reef. These areas where debris was located are shown on Figure 3 immediately north of the area defined as the reef site. There are 2.7 acres of patchy/medium relief hardbottom located in the southwestern corner of this staging area. Additionally, there are 32.9 acres of penshell/shellhash community located nearshore.

3.3.3 Borrow Areas E and F (R-84 to R-86)

The staging area surveyed between monuments R-84 to R-86 contains only 1.9 acres of patchy/low relief hardbottom. The majority of this resource is located in an isolated patch of hardbottom along the southeastern corner of the staging area (Figure 4).

3.3.4 Borrow Area G North (R- 91to R-93)

The northern pipeline corridor for Borrow Area G ends at the staging area offshore of Monuments R-91 to R-93. This staging area has a total of 12.5 acres of marine resources.

Figure 5 shows the relative distribution of patchy/low relief hardbottom located within this area. In total, there are 9.9 acres of patchy/low relief hardbottom in this area. The remaining 2.6 acres located in this area are along the southeastern boundary of the survey area and consists of penshell/shellhash community.

3.3.5 Borrow Area G South and H (R-99 to R-103)

Resources within this staging area are isolated patches randomly scattered throughout the area. In total, 8.2 acres of patchy/medium relief hardbottom are located within this area. These resources are distributed over the majority of the staging area (Figure 6). The largest areas of occurrence are along the northern edge of the staging area.

3.3.6 Borrow Area I (R-58 to R-61)

The staging area for Borrow Area I has a total area of 129.6 acres. This area is predominately sand (99.4 acres) and penshell/shellhash community (27.0 acres). Located in this staging area are also 3.2 acres of patchy/low relief hardbottom resources (Figure 7).

3.4 Pass-a-Grille Channel

The Pass-a-Grille Channel was also surveyed and characterized during this study. A total of 4.6 acres of marine resources were located within the survey limits of Pass-a-Grille Channel (Figure 9). These areas consisted of patchy/low relief hardbottom/livebottom within the interior portions of the channel.

4.0 CONCLUSIONS AND RECOMMENDATIONS

This survey was conducted to determine the potential for utilization of the pipeline corridors and nearshore areas located offshore of the Pinellas County shoreline. Since the methods to be employed by the contractors are not known a complete impact assessment cannot be fully reviewed at this time. Recommendations on the use of these areas and their potential for utilization in the future will be addressed in this section.

4.1 Pipeline Corridors

Utilization of pipeline corridors by dredging contractors may result in impacts to marine resources. The corridors for Borrow Areas D and G have particularly extensive areas of hardbottom resources (Table 8). These resources would not be avoidable should they be used for pipeline access to the beach. Both of these areas have nearshore staging areas that may be utilized and if it is cost effective, hopper dredging or some other technique may be utilized to minimize impacts. Should impacts be unavoidable, mitigation for these impacts would be required. Construction of artificial reefs may be attempted to offset the damage done by pipe placement.

The other pipeline corridors surveyed have few or isolated areas of hardbottom/livebottom habitats, and avoidance of these habitats may be possible. The corridors surveyed were 500 feet in width and the majority of pipeline corridors will only need to be approximately 50 feet in width. Careful planning and placement by the contractor can be used to avoid or minimize impacts to these resources.

Further surveying of the pipeline placement during construction, as well as equipment placement may need to be conducted before, during and after construction to judge actual impacts to the marine resources present in each area. This monitoring of the construction activity will allow for correct mitigation ratios and impact assessments.

4.2 Nearshore Staging Areas

The use of hopper dredges or booster pumps may require the utilization of the nearshore staging areas. Portions of these areas have marine resources as described above and summarized in Table 8. In most cases, however, these areas may be utilized with minimal impact to hardbottom/livebottom resources. Exclusion zones can be created in areas where marine resources are present, and access by the contractors machinery can be denied in these areas. Additionally, placement of pipelines can be done to avoid these nearshore habitats. Should any impacts be unavoidable within these nearshore areas mitigation would be required.

The staging area located at the southern end of Borrow Area D contains an artificial reef, which should be avoided. Buffer zones would need to be established to avoid this area. This survey revealed an area of debris north of this artificial reef. Storm events may be moving areas of this artificial reef from its original location. Examination of the side scan record and further surveying in the area prior to construction may be needed to insure a clear corridor for equipment prior to use.

The penshell/shellhash communities present within some of these nearshore staging areas are not true hardbottom. They do, however, appear to be an important marine resource within this area. Impacts to these areas should be included in any impacts analysis done for future projects. Consultation with the appropriate agencies for these habitats may also need to be done prior to any construction.

Monitoring of the areas to be utilized during a project should be done before, during and after construction. Monitoring of these habitats will not only allow better impact assessment but also aid in mitigation of these impacts and allow for better planning for future projects.

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